REMARKS

Claims 3-6, 8-11 and 13-31 are pending in the application.

Claims 6, 10, 11, 13-21 and 23-27 have been allowed.

Claims 9, 22 and 28-31 have been rejected.

Claims 3-5 and 8 have been objected to.

I. CLAIM REJECTIONS – DOUBLE PATENTING

Claims 9 and 28 were provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 and 17 of copending Application No. 10/540,791.

The provisional double-patenting rejection of these claims is noted. The Applicants will address this issue at such time as the '791 application issues, and the actual differences between the issued claims and the claims in the present application can be analyzed.

II. REJECTION UNDER 35 U.S.C. § 103

Claims 9 and 28-31 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Applicant's Admitted Prior Art (hereinafter "APA") (specification, page 2, line 6- page 3) in view of U.S. Patent No. 7,130,365 to *Li* (hereinafter "Li"), U.S. Patent No. 6,177,906 to *Petrus* (hereinafter "Petrus"), and U.S. Patent Publication No. 2002/0061005 to *Lee, et al.* (hereinafter "Lee"). The rejection is respectfully traversed.

Claim 22 was rejected under 35 U.S.C. § 103(a) as being unpatentable over APA (specification, page 2, line 6 – page 3) in view of Li and Lee. The rejection is respectfully traversed.

In *ex parte* examination of patent applications, the Patent Office bears the burden of establishing a *prima facie* case of obviousness. MPEP § 2142; *In re Fritch*, 972 F.2d 1260, 1262, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992). The initial burden of establishing a *prima facie* basis to deny patentability to a claimed invention is always upon the Patent Office. MPEP § 2142; *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); *In re Piasecki*, 745 F.2d

1468, 1472, 223 U.S.P.Q. 785, 788 (Fed. Cir. 1984). Only when a *prima facie* case of obviousness is established does the burden shift to the applicant to produce evidence of nonobviousness. MPEP § 2142; *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); *In re Rijckaert*, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993). If the Patent Office does not produce a *prima facie* case of unpatentability, then without more the applicant is entitled to grant of a patent. *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); *In re Grabiak*, 769 F.2d 729, 733, 226 U.S.P.Q. 870, 873 (Fed. Cir. 1985).

A *prima facie* case of obviousness is established when the teachings of the prior art itself suggest the claimed subject matter to a person of ordinary skill in the art. *In re Bell*, 991 F.2d 781, 783, 26 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1993). To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed invention and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. MPEP § 2142. In making a rejection, the examiner is expected to make the factual determinations set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966), *viz.*, (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; and (3) the level of ordinary skill in the art. In addition to these factual determinations, the examiner must also provide "some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir 2006) (cited with approval in *KSR Int'l v. Teleflex Inc.*, 127 S. Ct. 1727, 1741, 82 USPQ2d 1385, 1396 (2007)).

1. The Applicants respectfully submit that the combination of cited references fails to teach or suggest all the claim elements of independent Claim 22. Specifically, Claim 22 recites, "carry out a baseband processing according to control information received one-off by the receiver." The

Office Action appears to suggest that page 2, line 6 to page 3 of the Applicants' disclosure teaches control information received one-off by the receiver as being prior art. For ease of reference, the section the Applicants' disclosure cited in the Office Action is reproduced below:

> [0005] Now an example of a mobile terminal based on TD-SCDMA standard will be given to show the makeup of the single antenna system in current mobile terminals and the challenges smart antenna faced when applied to the said single antenna system.
>
> [0006] FIG. 1 is a block diagram for a standard mobile phone with single antenna, comprising antenna 100, RF module 101, ADC/DAC module 102, baseband physical layer processing module 103, baseband control module 104 and baseband higher layer processing module 105, wherein baseband physical layer processing module 103 may be composed of Rake receiver, spreading/de-spreading module, modulating/demodulating module and Viterbi/Turbo coding/decoding module; while baseband higher layer processing module 105 may be composed of source coder/decoder.
>
> [0007] In the downlink, radio signals received by antenna 100 are first amplified and down-converted to intermediate frequency (IF) signals or analog baseband signals in RF module 101; then the intermediate frequency signals or analog baseband signals are transformed to digital baseband signals to be inputted to baseband physical layer processing module 103, after being sampled and quantified in ADC/DAC module 102; in baseband physical layer processing module 103, depending on the control signals from baseband control module 104, signals obtained by successive operations such as Rake receiving, de-spreading, demodulating, deinterleaving, JD (joint detection), Viterbi/Turbo decoding and etc, are provided to baseband higher layer processing module 105; in baseband higher layer processing module 105, the data processed by baseband physical layer processing module 103 will be further processed in data link layer, network layer or higher layer, including higher layer signaling processing, system controlling, source coding/decoding and etc.
>
> [0008] At present, the above mobile phone technology with single antenna is very mature. Many manufacturers, including Philips, have developed sound chip-set solutions, where the function of the said baseband physical layer processing module 103 is generally realized by baseband MODEM based on ASIC (application specific integrated circuits).
>
> [0009] Whereas the introduction of smart antenna technology into present mobile

> phones will totally change the settings of the whole baseband physical layer processing module, whose hardware and corresponding software, such as Rake receivers, de-spreading functions and etc, can hardly be utilized.
>
> [0010] To reuse the standard baseband system design, Innovics Inc, an electronics equipment provider in L.A., Calif., provided a mobile phone device with smart antennas as shown in FIG. 2.
>
> [0011] As shown in FIG. 2, SA (smart antenna) module 206 comprises antenna combiner 208 and combining control module 207, wherein combining control module 207 adjusts two groups of weights of antenna combiner 208, according to the feedback signals outputted from Rake receiver & de-spreading module 209 and Viterbi/Turbo decoder module 210, while antenna combiner 208 combines the inputted signals of the two channels by individually multiplying a group of weights, according to the control signal provided by combining control module 207.

The Applicants are unable to find any teaching or suggestion of control information that is received one-off by the receiver as being prior art in the cited section or any section of the Applicants' disclosure. The Applicants respectfully submit that all limitations of the claimed invention must be considered when determining patentability. *In re Lowry*, 32 F.3d 1579, 1582, 32 U.S.P.Q.2d 1031, 1034 (Fed. Cir. 1994).

The Applicants respectfully submit that the combination of cited references fails to teach or suggest "carry out a baseband processing according to control information received one-off by the receiver" as recited in independent Claim 22.

2. Independent Claim 22 also recites, "wherein said control information is based upon data outputted from one of a plurality of groups of radio frequency signal processing modules before processing by said smart antennas is enabled." With regard to this element, the Office Action states that the initialized weight vector of Petrus only passes a single antenna signal, and the actual combining of multiple antenna signals is not enabled until the next converged weight vector. In support of this interpretation, the Office Action cites the following section of Petrus:

> ...When a least squares criterion is used, the general method includes the following steps:

1. Initialize the weight vector. For example, use $w_{r,initial}$ =[1 0 0 . . . 0]' where x' denotes the transpose of x. In an improved embodiment, the singular vector of R_{zz} =ZZ^H corresponding to the largest singular value is used. In yet another embodiment, the weight vector from the previous burst is used. As will be described below, one aspect of the present invention includes using a decision directed method after a partial property method is used. In such a case, when implemented in any of the embodiments of the present invention, the last obtained weight vector (i.e., using a partial property restoral method) is used;
2. Perform a signal copy

$$s(t) = w_r^H z(t), \qquad (8)$$

followed by decimation/interpolation if the samples are originally oversampled (in an alternative, the decimation/interpolation may occur prior to the copy signal operation);
3. Estimate timing and frequency offset to produce a signal that has the correct timing and frequency offsets;
4. Determine a reference signal $s_{ref}(t)$ by making symbol decisions (i.e., demodulating), such that $s_{ref}(t)$ has the correct bit stream and the same modulation scheme, and the same timing and frequency offsets as the signal transmitted to the receiver from the particular user;
5. Computing the weight vector by least squares minimization of over w_r. (Col. 12, lines 5-36.)

Petrus simply discloses applying a least squares criterion to achieve the "best" weights. The Applicants are unable to see how having an initial weight vector of $w_{r,initial}$ =[1 0 0 . . . 0]' (where x' denotes the transpose of x) teaches or suggests that only a single antenna signal passes. Furthermore, Petrus does not appear to teach or suggest that the actual combining of multiple antenna signals is not enabled until the next converged weight vector, particularly when the cited section of Petrus clearly states that a signal copy is performed after the weight vector is initialized.

Figure 6 of Petrus shows both signals from both receiving blocks 122 going into signal copy operation 607, not a single signal from a single receiving block 122 as suggested in the Office Action. Furthermore, Col. 18, lines 18-30 states:

> FIG. 6 shows the block diagram of the preferred embodiment multi-port adaptive smart antenna processing apparatus. In each port, **the oversampled outputs 605 of receivers 122 from the antenna elements 103 are combined in a signal copy operation 607**, initially using an initial weight vector 631-i, i=1, . . . , N_S for the first, .

> . . , N_Sth port, respectively, these initial weights provided by a weight initializer 621. The resulting copy signal is timing offset corrected by timing offset corrector unit 609 which also decimates/interpolates to produce a set of approximately baud-aligned samples (for the CM method iterations) or substantially baud-aligned samples (for the decision directed method iteration(s)) baud-aligned samples. (Emphasis added by the Applicants.)

Therefore, the resulting copy signal is a combination of the oversampled outputs 605 from receivers 122, not a single signal from a single receiver 122. As such, the correct or best weights are based upon a combination of signals from two or more receivers not from data outputted from one of the plurality of groups of radio frequency signal processing modules as suggested by the Office Action.

In distinct contrast, Paragraphs [0048] and [0057] of the Applicants' published application state:

> [0048] Firstly, the smart antenna baseband processing is disabled in SA module 306. At this time SA module can receive signals from single-channel RF signal processing module, i.e. SA module 306 can be regarded as a through path to signals from :o single-channel RF signal processing module. Then baseband physical layer processing module 303 first obtains DwPTS and user-specific midamble of signals inputted from single-channel RF signal processing module after the connection between the mobile phone and base station is established.
>
> [0057] 1. In the above step 1, SA module is disabled at the first beginning, and it starts to work by data-driving only when receiving SA control commands via the data bus in step 2, wherein the SA commands include synchronization information for synchronizing the inputted signals, such as DwPTS, user-specific midamble, signals for enabling SA module and selecting the weight algorithm. That is to say, the synchronization information is obtained before SA module starts to work, therefore SA module can reuse the synchronization function of baseband physical layer processing module 303, and conflicts won't be caused.

The Applicants respectfully submit that the combination of cited references fails to teach or suggest "wherein said control information is based upon data outputted from one of a plurality of groups of radio frequency signal processing modules before processing by said smart antennas is enabled" as recited in independent Claim 22.

3. Independent Claim 22 further recites, "wherein said control information at least includes: a signal used to enable the smart antenna baseband processing, down-link pilot time slot data and a Midamble." The Office Action appears to suggest that Lee discloses a signal used to enable the smart antenna baseband processing. For ease of reference, the section of Lee cited in the Office Action is reproduced below:

> [0036] ... a controller for generating a switching control signal in a non-transmission period of a sub-frame associated with the radio signal amplified by the power amplifier; and a switch for switching the amplified radio signal from the power amplifier to one antenna of two antennas, and switching the amplified radio signal to another antenna of the two antennas in response to the switching control signal.

The Applicants respectfully submit that switching the amplified radio signal to another antenna of the two antennas is not the same as enabling smart antenna baseband processing. The Applicants respectfully submit that the combination of cited references fails to teach or suggest "wherein said control information at least includes: a signal used to enable the smart antenna baseband processing, down-link pilot time slot data and a Midamble" as recited in independent Claim 22.

Accordingly, for at least the reasons established above, the Applicants respectfully submit that independent Claim 22 is patentable over the combination of cited references.

Independent Claims 28 and 29 recite elements analogous to the novel elements emphasized above in traversing the rejection of independent Claim 22 and, therefore, also are patentable over the combination of cited references. Additionally, Claim 9 depends from Claim 28, and Claims 30-31 depend from Claim 29. As such, Claims 9 and 30-31 also are patentable over the combination of cited references.

Accordingly, the Applicants respectfully request withdrawal of the § 103(a) rejections of Claims 9, 22 and 28-31.

III. ALLOWABLE SUBJECT MATTER

The Applicant thanks the Examiner for the indication of allowability of Claims 6, 10, 11, 13-21 and 23-27.

Claims 3-5 and 8 were objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The Applicants thank the Examiner for this suggestion but elect not to rewrite Claim 3-5 and 8 at this time in view of the above arguments and remarks.

IV. CONCLUSION

As a result of the foregoing, the Applicants assert that the remaining Claims in the Application are in condition for allowance, and respectfully request an early allowance of such Claims.

If any issues arise, or if the Examiner has any suggestions for expediting allowance of this Application, the Applicants respectfully invite the Examiner to contact the undersigned at the telephone number indicated below or at ***rmccutcheon@munckcarter.com***.

The Commissioner is hereby authorized to charge any additional fees connected with this communication or credit any overpayment to Deposit Account No. 50-0208.

Respectfully submitted,

MUNCK CARTER, LLP

Date: 6/28/2010

Robert D. McCutcheon
Registration No. 38,717

P.O. Box 802432
Dallas, Texas 75380
(972) 628-3600 (main number)
(972) 628-3616 (fax)
E-mail: *rmccutcheon@munckcarter.com*